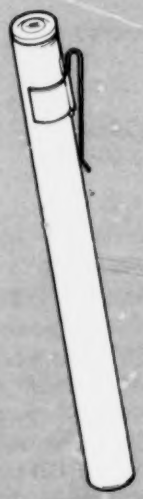
11-6665-233-10

TM 11-6665-233-10

OPERATOR'S MANUAL



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RADIACMETER IM-185/UD
(NSN 6665-01-042-9401)

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1983

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TECHNICAL MANUAL
No. 11-6665-233-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D C
6 JULY 1983

OPERATOR'S MANUAL

RADIACMETER IM-185/UD
(NSN 6665-01-042-9401)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. A reply will be furnished to you.

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CHAPTER I

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. Scope

a. Type of Manual: Operator's

b. Equipment Covered: Radiacmeter IM-185/UD.

c. Purpose of Equipment: Detects and measures radiation from nuclear weapons detonations and/or fallout.

d. Special Limitations: A special power supply, the PP-4370/PD, is required to set up the IM-185/UD for operation. The IM-185/UD must be calibrated in accordance with TB 43-180.

1-2. Maintenance Forms and Records

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, the Army Maintenance Management System (TAMMS).

1-3. Reporting Equipment Improvement Recommendations (EIR's)

If your Radiacmeter IM-185/UD needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. We'll send you a reply.

1-4. Nomenclature Cross-Reference List, Abbreviations and Glossary

a. Nomenclature Cross-Reference List

Common Name	Official Nomenclature
Dosimeter	Radiacmeter IM-185/UD
Charger or PP-4370/PD	Charger, Radiac Detector PP-4370/PD

b. Abbreviations

cGy (RAD)	A unit of gamma and/or neutron radiation absorbed dose.
X-ray	Energetic high-frequency electromagnetic radiation.

c. Glossary

cGy	Centigray or .01 Gy 1.0 rad = .01 Gy and 1 rad = 1 cGy.
Gamma ray	Penetrating short-wavelength electromagnetic radiation of nuclear origin.
Gray	International standard unit of absorbed dose of radiation.
Neutron radiation	Uncharged, highly penetrating particles emitted by the nucleus of an atom.
X-ray	Penetrating high-frequency radiation of nuclear origin.

Section II. EQUIPMENT DESCRIPTION

1-5. Equipment Characteristics, Capabilities, and Features

a. Purpose

Detects and measures the absorbed dose of neutron and/or gamma radiation from weapons and/or fallout.

Helps to warn soldiers of exposure to harmful radiation.

b. Capabilities

Detects and measures the following:

(1) X-ray, gamma-ray, neutron radiation from nuclear weapons detonations.

(2) X-ray, gamma radiation from fallout debris.

c. Features

(1) Self-contained in a metal barrel that can be clipped to your clothing.

(2) The cGy (rads) scale is magnified for easy reading.

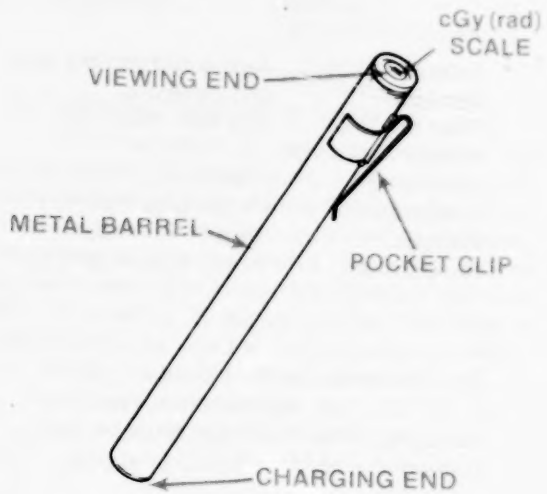
(3) The dosimeter is not repairable.

NOTE

Whenever the term radiation is used in this manual, it refers to both neutron and/or gamma radiation.

1-6. Location and Description of Major Components

The dosimeter consists of a metal barrel that contains the detection and measurement components. It has a charging end for use with the PP-4370/PD, a viewing end for reading the cGy(rad) scale, and a pocket clip for attaching the dosimeter to clothing.



RADIACMETER IM-185/UD

1-7. Equipment Data

WEIGHTS AND DIMENSIONS

Weight	Approximately 1.5 ounces (42 grams)
Length	4.875 inches (12.38 centimeters)
Diameter	0.6 inch (1.52 centimeters)

PERFORMANCE

Type of radiation detected	X-rays and gamma rays, and neutrons
Total range of dosage measured	0 to 600 cGy(rad)
Operating temperature	−25° F to +125° F (−32° C to +52° C)
Storage temperature	−65° F to +125° F (−55° C to +52° C)

NOTE

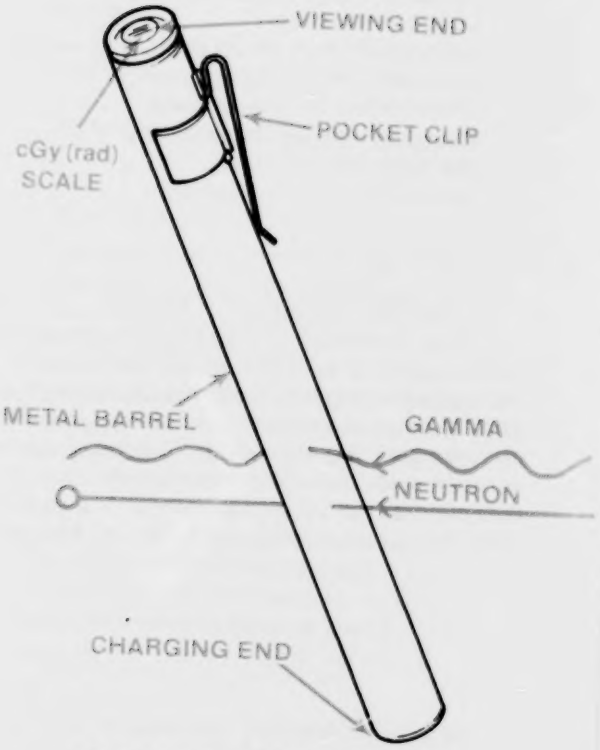
The dosimeter can be stored at −65° F (−55° C), but maintenance (vacuum pumping) while in storage must be performed at −25°F (−32°C) or above.

Type of detector	Collection chamber
Type of indicator	Image (shadow) of electrometer fiber on a calibrated scale

Leakage (radiation-free area)	Less than 3 cGy(rad) per day
Calibration accuracy	±20 percent for mixed-field radiation exposures
Charging voltage (for zero reference)	Positive 450 volts maximum

1-8. Technical Principles of Operation

The dosimeter is a sealed assembly in a metal barrel. It contains an electrometer in a high vacuum chamber. Movement by a fiber (hair-line) is used to indicate cumulative radiation absorbed by the dosimeter. The fiber moves across a scale that measures radiation from 0 to 600 cGy(rad) in 20 cGy divisions. The scale is magnified at the viewing end for easier reading.



RADIACMETER IM-185/UD

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. Operator's Controls and Indicators

CHARGING END slides into PP-4370 charging socket for pumping and charging the dosimeter.

METAL BARREL contains detection and measurement components.

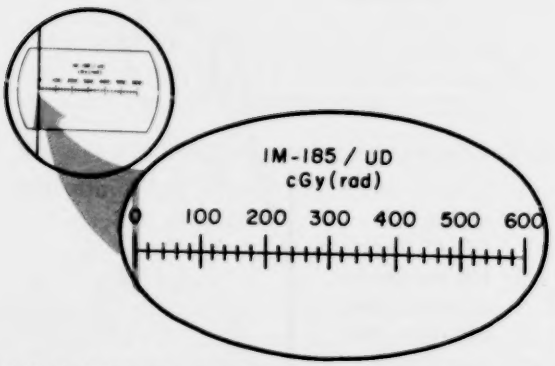
POCKET CLIP attaches dosimeter to your clothing.

VIEWING END contains cGY(rad) scale for reading amount of gamma and/or neutron radiation measured by dosimeter.

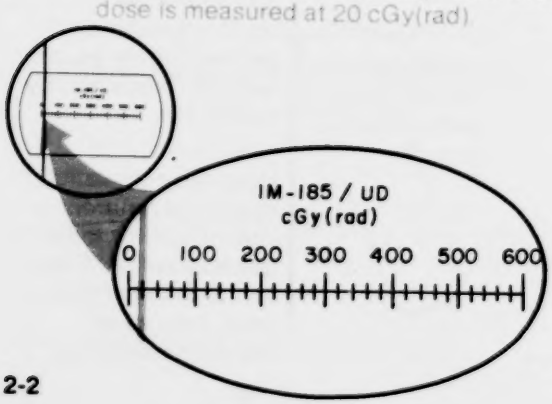
cGY(rad) SCALE Indicates cumulative amount of neutron and/or gamma radiation absorption. Fiber (hairline) deflects to show amount of radiation measured.

HOW TO READ THE cGy(rad) SCALE:

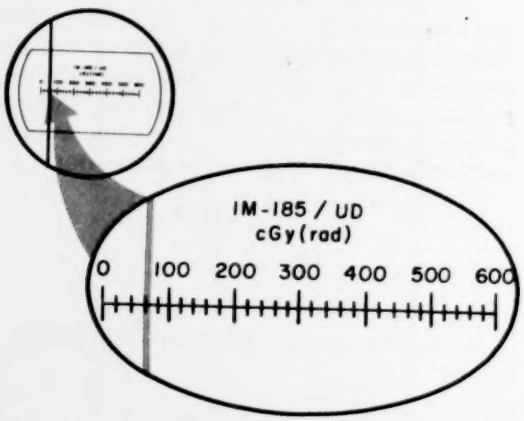
DAY 1. Fiber (hairline) is at 0. No radiation is detected.



DAY 2. Fiber (hairline) is at 20 cGy(rad). Absorbed dose is measured at 20 cGy(rad).



DAY 3. Fiber (hairline) is at 60 cGy(rad). Additional absorbed dose from Day 2 is measured at 40 cGy(rad). Cumulative dose (Day 1 + Day 2 + Day 3) is measured at 60 cGy(rad).



2-2. Preventive Maintenance Checks and Services (PMCS)

PMCS consist of pumping and charging the dosimeter and performing the dosimeter self checks in paragraphs 2-3 and 2-4. If the dosimeter fails to operate, follow the instructions in Chapter 3. Report any discrepancies using the proper forms in accordance with TM 38-750.

SECTION II. OPERATION UNDER USUAL CONDITIONS

2-3. Preparation For Use

If required, the dosimeter must be pumped and charged before use, and whenever it becomes discharged due to leakage or radiation absorption. It is preferable to charge the dosimeter in a dust and radiation free area. Table 2-1 gives you the specific conditions and intervals for pumping and charging the dosimeter.

2-4. Pumping and Charging the Dosimeter

CAUTION

After charging the dosimeter, do not subject it to shocks, excessive dampness, or high temperatures. This can damage the equipment.

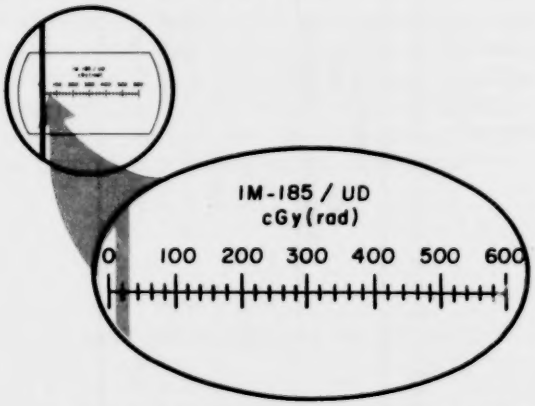
Instructions for pumping and charging the dosimeter are contained in TM 11-6665-234-12, the manual for the PP-4370/PD.

Table 2-1. Time Intervals At Which Dosimeter Should Be Pumped

Temperature	Operational Use		
	No Radiation	With Radiation	In Storage
+100 to +125° F (+38 to +52° C)	3 Days	1 Day	1 Month
+ 70 to +100° F (+21 to +38° C)	1 Week	4 Days	3 Months
+ 40 to + 70° F (+ 5 to +21° C)	3 Weeks	10 Days	1 Year
0 to + 40° F (−18 to + 5° C)	10 Weeks	3 Weeks	2 Years
− 25 to 0° F (−32 to −18° C)	1 Year	4 Months	3 Years
Below −25° F (below −32° C)	3 Years	1 Year	4 Years

2-5. Dosimeter Self-Checks

a. After pumping and charging the dosimeter, hold it up to the light and observe the cGy(rad) scale. The cGy(rad) scale should read between 0 and 20 cGy(rad).



b. Tap the dosimeter gently with your finger. Make sure the image (hairline) on scale disappears and then reappears.

NOTE

It may take up to 15 seconds for the image (hairline) to reappear.

c. The dosimeter is now ready for use.

2-6. Operating Procedure

Use the pocket clip to attach the dosimeter to your clothing. Read the cGy(rad) scale to determine the total amount of absorbed radiation dose as follows:

a. Reading the cGy(rad) Scale:

(1) Hold the dosimeter up to the light. Note the position of the image (hairline) on the scale.

(2) Tap dosimeter gently. Make sure the image (hairline) moves and then returns to the position in step (1).

NOTE

If the image (hairline) does not disappear momentarily when the dosimeter is tapped, the equipment is not operating properly. It must be charged and pumped in order to get an accurate reading.

Pump and charge the dosimeter, if necessary, and then repeat steps (1) and (2) above.

b. Determining Amount of Radiation

(1) Note the reading on the scale at the beginning of your mission.

(2) Read the scale at the end of your mission.

(3) Subtract the reading taken when you started your mission from the reading taken at the end of your mission. This gives you the amount of radiation absorbed.

EXAMPLE 1: cGy(rad) scale reads 0 when you start and 110 at the end.

END	110 cGy(rad)
START	−0 cGy(rad)
TOTAL RADIATION =	110 cGy(rad)

EXAMPLE 2: cGy(rad) scale reads 75 cGy(rad) when you start and 110 at the end.

END	110 cGy(rad)
START	−75 cGy(rad)
TOTAL RADIATION =	35 cGy(rad)

Section III. OPERATION UNDER UNUSUAL CONDITIONS

2-7. Operation In Unusual Temperature Extremes

Dosimeter accuracy and performance can be temporarily affected with temperature and with large exposures to radiation. It is important to repump and recharge the dosimeter at specified intervals. Use table 2-2 to check the frequency of pumping under the temperature conditions in your area.

NOTE

When 300 cGy(rad) or more has been measured, repump and recharge as soon as possible.

2-8. Special Storage Requirements

When in storage, the dosimeter requires pumping at specific intervals. Refer to table 2-2 for temperature conditions and related pumping intervals.

Table 2-2. Time Intervals At Which Dosimeter Should Be Pumped

Temperature	Operational Use: No Radiation	Operational Use: With Radiation	In Storage
+100 to +125° F (+38 to +52° C)	3 Days	1 Day	1 Month
+ 70 to +100° F (+21 to +38° C)	1 Week	4 Days	3 Months
+ 40 to + 70° F (+ 5 to +21° C)	3 Weeks	10 Days	1 Year
0 to + 40° F (−18 to + 5° C)	10 Weeks	3 Weeks	2 Years
− 25 to 0° F (−32 to −18° C)	1 Year	4 Months	3 Years
Below − 25° F (below −32° C)	3 Years	1 Year	4 Years

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. TROUBLESHOOTING

3-1. General

Table 3-1 contains troubleshooting procedures to help locate and correct troubles that may develop in the dosimeter. Perform the tests or inspections, and the corrective actions, step by step, as they are listed.

3-2. Troubleshooting Procedures

This manual cannot list all the malfunctions that may occur, nor all the tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by listed corrective actions, notify your supervisor.

Table 3-1. Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. Image (Hairline) On cGy(rad) Scale Does Not Disappear When Dosimeter Is Gently Tapped **Step 1.** Pump and charge dosimeter on PP-4370/PD. If dosimeter checks good after pumping and charging, return to service. If dosimeter still checks bad after 5 minutes of pumping, replace dosimeter. **Step 2.** Pump the inoperable dosimeter for at least 30 minutes. If dosimeter is still inoperable turn in in accordance with standard supply regulations.

Table 3-1. Troubleshooting – Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
2. Electrical Leakage Rate Of Dosimeter Exceeds 3 cGy(rad) Per Day NOTE Electrical leakage can occur when the dosimeter is exposed to a bad vacuum condition or when it has been stored in an uncharged condition and is then fully charged. Leakage can also occur when dirt collects inside the dosimeter. Pumping can remove this dirt. Do **not** check the leakage rate until the dosimeter has been charged to approximately 0 cGy(rad) for 5 days in a row. Ignore the daily leakage during this time.

Table 3-1. Troubleshooting -- Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 1. Charge the dosimeter to read approximately 0 cGy(rad) on cGy(rad) scale; then store the dosimeter in a radiation free area for 24 hours. **Step 2.** After 24 hours, take out the dosimeter and read the scale. Note the difference between 0 cGy(rad) and the current reading. If the leakage rate is more than 3 cGy(rad) per day: Clean the socket in the charging end of the dosimeter with a few drops of denatured alcohol. Thoroughly dry the dosimeter by rapidly waving it in the air.

Table 3-1. Troubleshooting — Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CAUTION Do **not** insert sharp objects into the charging end of the dosimeter. This will damage the socket. Do **not** blow on the dosimeter or use a drying cloth. The charging end must be free of moisture and lint. **Step 3.** Pump the dosimeter for 20 minutes in the PP-4370/PD.

Table 3-1. Troubleshooting — Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 4. Recheck the leakage rate by performing steps 1, 2, and 3 above. If the leakage rate is still more than 3 cGy(rad) per day, replace dosimeter. **Step 5.** Pump the inoperable dosimeter for at least 30 minutes. If dosimeter still checks bad after 30 minutes, discard in accordance with standard procedures.

Section II. MAINTENANCE PROCEDURES

3-3. Introduction

This section covers maintenance of the dosimeter. It contains procedures for cleaning, decontaminating, maintaining the vacuum and charge and checking the leakage rate. Maintenance of the dosimeter requires the following equipment and supplies:

a. Radiac Detector Charger PP-4370/PD.
b. Denatured alcohol (Item 1, App. D).

3-4. Cleaning

CAUTION

Do **not** insert sharp objects into the charging end of the dosimeter. This will damage the socket.

a. Carefully wash the charging end and viewing end of the dosimeter with a few drops of denatured alcohol.

CAUTION

Do **not** blow on the dosimeter and do **not** use a drying cloth. The charging end must be free of moisture and lint.

b. Thoroughly dry the dosimeter by rapidly waving it in the air.

3-5. Decontaminating

a. Prepare a solution of detergent and clean water or prescribed decontamination solution.

b. Wash the dosimeter in the solution.

c. Rinse the dosimeter in clear water.

d. Clean the charging end and viewing end with denatured alcohol, (see paragraph 3-4 above).

3-6. Maintaining Vacuum and Charge in Storage

Before storing the dosimeter or placing it in standby status:

a. Charge the dosimeter to approximately 0 cGy(rad) on the PP-4370/PD.

b. Place the dosimeter in a dust and radiation free area.

c. Pump the dosimeter at the intervals specified for the temperature conditions in your area. (See Table 2-2).

NOTE

If possible, refrigerate dosimeters in a manner similar to storage used for dry batteries. This reduces the pumping and inspection intervals.

d. When the dosimeter is removed from storage or standby status, check the leakage rate by the following procedures in paragraph 3-7 below, and then recharge it.

3-7. Checking the Electrical Leakage Rate

NOTE

Do not check the leakage rate until the dosimeter has been charged to read approximately 0 cGy(rad) for 5 days in a row.

a. Refer to TM 11-6665-234-12 and pump the dosimeter.

b. Charge the dosimeter to read approximately 0 cGy(rad) on the calibrated scale.

c. Store the dosimeter in a radiation free area for 24 hours.

d. After 24 hours, read the cGy(rad) scale and note the difference between 0 and the current reading. This reading is the leakage rate in cGy(rad) per day.

e. If the leakage rate is more than 3 cGy(rad) per day, clean the dosimeter (paragraph 3-4) and pump the dosimeter for 20 minutes in the PP-4370/PD as described in TM 11-6665-234-12.

f. Recheck the leakage rate as described in a through e above. If the leakage rate is still too high, replace dosimeter.

APPENDIX A

REFERENCES

A-1. Scope

This appendix lists all forms, technical manuals and miscellaneous publications referenced in this manual.

A-2. Forms

DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 2407	Maintenance Request
DA Form 2028	Recommended Changes to DA Publications
SF 368	Quality Deficiency Report

A-3. Technical Manuals

TB 43-180	Calibration Requirements for US Army Electronics Equipment

APPENDIX A

REFERENCES — Continued

TM 11-6665-234-12	Operator's Manual: Charger, Radiac Detector PP-4370/PD
TM 11-6665-227-12	Operator's Manual: Calibrator Set AN/UDM-2
TM 38-750	The Army Maintenance Management System (TAMMS)

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. Scope

This appendix lists expendable supplies and materials you will need to operate and maintain the IM-185/UD. These are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. Explanation of Columns

a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 1, Appx. D).

b. Column 2 - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Organizational Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. Column 3 - National Stock Number. This is the national stock number assigned to the item, use it to request or requisition the item.

d. Column 4 - Description. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

e. Column 5 - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item No.	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	C	6810-00-222-2376	ALCOHOL, DENATURED	QT

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

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